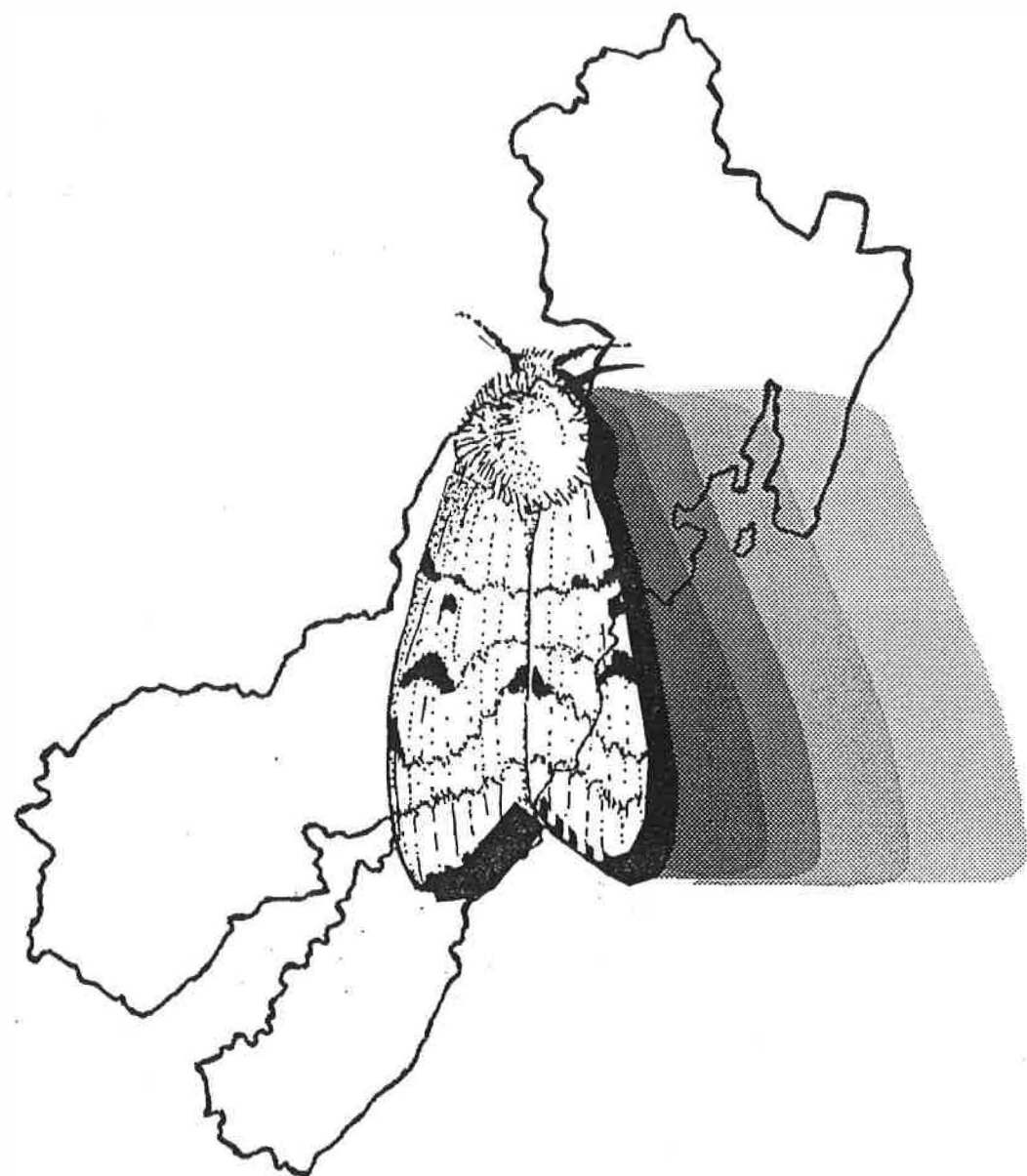


#7

BIOLOGICAL EVALUATION
OF GYPSY MOTH POPULATIONS,
MONONGAHELA NATIONAL FOREST, WEST VIRGINIA
1992



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SUMMARY

The gypsy moth, *Lymantria dispar* (Linneaus), caused visible defoliation during 1992 only on the northern portions of the Potomac RD, Monongahela NF (MNF).

A strategy for gypsy moth integrated pest management (GMIPM) has been developed and implemented for the MNF. This document presents the strategy and the results of its implementation in 1992. The biological situation has been presented concerning the current gypsy moth infestations and what impact they are likely to have on the management of the MNF's traditional resources of timber, wildlife and recreation.

This biological evaluation was based on gypsy moth egg mass surveys made during October and November 1992 to determine the current population densities in forest stands of susceptible oak type on the Potomac RD. Surveys showed where gypsy moth infestations would exceed each of the three damage thresholds of nuisance/defoliation/tree mortality.

Criteria for establishing treatment units to reduce this biological threat to resources were identified jointly by MNF and Forest Health Protection (FHP) personnel. The intent was to determine where gypsy moth infestations would cause the greatest impacts to the National Forest resource values and uses during the next growing season.

Two proposed treatment alternatives were developed through NEPA scoping. Treatments involve aerially spraying insecticides in May 1993 for the following reasons: 1) prevent nuisance and aesthetic loss in developed recreation areas; 2) reduce tree mortality and maintain wildlife habitat where management goals were timber and wildlife oriented; 3) enhance visual quality for dispersed recreation; 4) promote biodiversity through protecting forest health.

INTRODUCTION AND BACKGROUND

Gypsy moth defoliation during 1992 is shown in the context of the entire state of West Virginia to bring the infestations into perspective for the MNF (Map 1). Moderate forest defoliation by the gypsy moth has existed on the MNF for at least the last two years based on aerial sketchmapping information (Map 2). A smaller area of defoliation occurred in 1992 than in 1991. No forest damage surveys to quantify tree mortality resulting from this infestation have been made to date. However, in similar susceptible oak forests in the eastern panhandle of West Virginia, and in Pennsylvania, Maryland and Virginia, gypsy moth infestations have caused substantial oak mortality. Impacts on timber production and the permanent alteration of forest stand structure on wildlife habitat and biodiversity have been documented by research and management in these states as well. The adverse impacts of larval nuisance, defoliation, and tree mortality on developed recreation sites also have been documented.

OBJECTIVES

The objectives of this biological evaluation within the context of GMIPM were to: 1) generally estimate gypsy moth population densities within the susceptible forest types of the Potomac RD; 2) reasonably predict how the subsequent damage caused by those populations would impact forest resources during the next growing season; 3) develop environmentally responsible and economically feasible management tactics to suppress

those populations posing the greatest risk to national forest resource values and uses while concurrently maintaining habitat and species diversity.

SURVEY PROCEDURES

The following approach to GMIPM was developed for the MNF in FY 1993 by Bob Acciavatti, FHP-Morgantown, and presented at the Potomac RD on Wednesday, November 18, 1992. The approach is based on the white paper entitled "Post AIPM Gypsy Moth Management with the Proclamation Boundary of the Monongahela National Forest" jointly agreed to by R-9, MNF and NA, FHP on September 28, 1992, at Elkins, WV.

GMIPM Strategy and Procedures

1. Results of the 1992 defoliation survey established where gypsy moth populations were now at outbreak densities on the MNF. Portions of two northernmost Ranger Districts were to be considered for gypsy moth integrated pest management in FY 1993 as follows:

Potomac RD - Spruce Knob-Seneca Rocks NRA
Cheat RD - Horseshoe Run and North of Stuart Park
2. Surveys determined where the most susceptible gypsy moth host tree species (oaks) predominate in compartments with management goals of timber (3.0), wildlife habitat (6.1), dispersed recreation with salvage only (6.2) and developed recreation areas. For each surveyed RD, these were:

Potomac RD - 54 compartments;
3 campgrounds
Cheat RD - 4 compartments;
2 campgrounds
3. FHP established randomly dispersed 1/40-acre survey plots of a variable number throughout each surveyed compartment, depending upon time and personnel available during the 6 weeks from October 1 - November 15, 1993.
4. At each survey plot, the following data were recorded:
* the number of new and old gypsy moth egg masses;
* the estimated percentage of oak trees on plot and in surrounding stand;
* the egg mass size for new egg masses;
* the presence of *Ooencyrtus* parasitic wasps were on egg masses;
* the dead larvae killed by virus (NPV) and *Entomophaga* fungus.
5. FHP utilized a regression curve showing gypsy moth host type defoliation resulting from gypsy moth egg mass densities as published by NEFES, Radnor, PA, to establish damage thresholds to be expected from the gypsy moth outbreak in May and June 1993. We prepared a chart of what forest resources values and uses (set as the highest four priorities for protection in the MNF Gypsy Moth Management White Paper) would be impacted by this damage as follows:

GYPSY MOTH DAMAGE AND IMPACT CHART

Gypsy Moth EM/Plot	Gypsy Moth EM/Acre	Forest Host Type Damage Threshold Class	Monongahela NF Forest Resources Impacted
0- 6	< 250	Minimal	None
7-12	250	Larval nuisance to people	Developed Recreation
13-24	500	Visible defoliation of 30-60%	T&E; Mgt. 8; Class A visual, general forest; nearby private land
25+	1000 +	Growth loss and dead trees from complete defoliation	Timber sales and high quality sites; hard mast crop; habitat diversity

6.

Survey data were interpreted in terms of Damage Threshold Classes which are based on research results and empirical observations as to the effect of gypsy moth populations at various densities on forest trees. For example, summer refoilation of a tree occurs after spring defoliation exceeds 60% causing depletion of food reserves. A tree may be able to recover from one refoilation, but it is unlikely it would recover from two successive years of this damage. Trees depleted of starch food reserves are highly vulnerable to attacks by phloem-feeding beetles, e.g. the two-lined chestnut borer, and infection by the Armillaria root rot fungus.
7.

The 950 egg mass survey plots locations were displayed on 7.5-minute USGS Quads using the following color codes for each gypsy moth damage class to help visualize the potential damage locations/areas:

(Green)

(Yellow)

(Orange)

(Pink)

MINIMAL

LARVAL NUISANCE

VISIBLE DEFOLIATION

GROWTH LOSS/DEAD TREES
8.

Using the current MNF Forest Plan for the Potomac RD we decided which locations/areas have greatest threat from current gypsy moth populations. The following criteria were utilized to determine this threat to resources:

Potomac RD Treatment Unit Priority Criteria for 1993 Suppression

- (1) New gypsy moth egg masses (EM) densities
 - (2) Gypsy moth defoliation 1991 and 1992
 - (3) Timber values and degree of vulnerability to mortality
 - (4) Highly sensitive dispersed recreation and scenic areas
 - (5) State Cooperative County Landowner Program (CSCLP) spray block proximity
 - (6) Spread of infestation out of USDA-APHIS Quarantine Areas and/or to nearby forested areas of National Forest
 - (7) Treatment unit size and spray material - efficiency - reducing need for retreatment in a subsequent year because of inadequate treatment of infested areas
9. FHP drew boundaries for each proposed treatment unit and calculated the acreage for each to achieve maximum suppression of potentially damaging gypsy moth populations in May 1993.
10. The MNF notified the public(s) of the intent of the Forest to conduct a gypsy moth spray project. The scoping meetings which follow should help to further identify issues and concerns to be addressed in an EA and Decision Notice, and perhaps identify the need for an EIS beyond the current USDA/FS & APHIS EIS.
11. MNF and FHP planned and organized a spray project using Incident Command System (ICS) to identify key team members and their responsibilities (develop project activities, schedules, contracting, and procurement of personnel, vehicles, aircraft, supplies, etc.).
12. FHP will evaluate the spray project using treatment monitoring to determine if the project meets its objectives, and to determine reasons for success/failure on each treatment unit.
13. FHP will be responsible for non-target monitoring during the spring of spraying for selected invertebrates. Lepidopterans are of special interest in determining biodiversity in the Spruce Knob-Seneca Rocks NRA. By surveying the moth fauna, FHP will document the presence and relative abundance of species considered to be of special concern, because they are unique to the area, or sensitive, or threatened and endangered, and likely to be feeding and exposed to insecticides in the treatment units.

RESULTS AND CONCLUSIONS

Gypsy moth populations exist at densities capable of causing damage by nuisance/defoliation/tree mortality over about one-third of the Potomac RD compartments surveyed. Surveys on the Cheat RD and on the remaining Potomac RD compartments indicated gypsy moth populations were innocuous to non-existent and would not pose a threat to resources in 1993. The natural control factors operating in the infestations were not quantitatively surveyed for lack of time and personnel. Observations, however, indicated that gypsy moth egg mass size for new egg masses was moderate to large and there appeared to be a low incidence of *Ooencyrtus* parasitic wasps on the egg masses. There was minimal evidence of larvae killed by nucleopolyhedrosis virus (NPV) and none of the dead larvae collected were found to be harboring resting spores of *Entomophaga* fungus.

Table 1 shows survey results for 41 of the Potomac RD compartments and Map 3 shows where the surveyed compartments are located. The potential for moderate to severe defoliation in 1993 exists within those compartments with the highest gypsy moth populations as expressed by the highest percent of survey plots falling within the damage classes of defoliation and tree loss (mortality).

Because the gypsy moth infestations on the Potomac RD are along the leading edge of the generally infested area, and the recent past history of gypsy moth is one of expansion into this part of the MNF where there is any abundance of susceptible tree species, it is predicted that gypsy moth populations will continue to spread and build to outbreak densities on the MNF over the next several years.

TREATMENT ALTERNATIVES

The next part of GMIPM seeks to determine where values are at risk this year from the gypsy moth infestations so that treatment units can be established for suppression considerations for 1993. Pre-, and post-suppression egg mass surveys are done to determine gypsy moth population changes and provide a measure of project effectiveness. In addition, treatment evaluation and non-target lepidopteran monitoring with FHP coordination, insures that the impact of gypsy moth management decisions on biodiversity can be evaluated.

Potentially damaging gypsy moth populations exist in susceptible forest type within numerous compartments of the Potomac RD. Seventeen units were jointly identified by the MNF and FHP as candidates for treatment to protect forest areas managed for timber, wildlife, recreation and biodiversity. These treatment units are shown in Table 2 and Map 4.

Basically, the MNF has three gypsy moth management options for these treatment units:

- 1) no action against the gypsy moth;
- 2) spray designated treatment units with microbial insecticides to prevent nuisance, defoliation, and subsequent tree mortality;
- 3) spray designated treatment units with a combination of microbial and chemical insecticides to prevent nuisance, defoliation, and subsequent tree mortality.

If the no action alternative is chosen, pre-suppression population densities within the treatment units (Table 3) indicate that the potential exists for the gypsy moth to cause nuisance and moderate to severe defoliation in portions of the Potomac RD in 1993. The current gypsy moth infestations are along the leading edge of the generally infested area of the southward expansion of gypsy moth. It is under these circumstances that increased risks from the expanding outbreaks can most impact the forest by increasing tree mortality, especially in oak type, where stands have been defoliated during one or more previous years.

RECOMMENDATION

We recommend the MNF give serious consideration to one of the spray treatment alternatives. National Forest resource values such as recreation, timber, wildlife, species biodiversity would be protected by suppressing building gypsy moth populations now rather than waiting until a large scale outbreak develops on the Potomac RD.

TABLE 1. GYPSY MOTH EGG MASS SURVEY, POTOMAC RD, MONONGAHELA NATIONAL FOREST, WV -
OCTOBER and NOVEMBER 1992

		Predicted 1993 Gypsy Moth Damage Class (Percent of Plots for Each Compartment)					
Compartment		Average	Number	None	Nuisance	Defoliation	Tree Loss
Number	Area (acres)	% Oak	of Plots	(%)	(%)	(%)	(%)
9	2,441	22	5	100	0	0	0
14	1,612	77	15	47	20	20	13
15	985	82	13	46	31	8	15
16	1,381	76	25	52	20	16	12
17	851	85	24	46	25	8	21
18	1,087	42	28	93	7	0	0
19	1,249	86	29	7	17	3	72
20	1,932	75	30	27	23	33	17
21	790	61	18	44	6	6	44
22	790	77	18	56	17	0	28
23	1,331	78	11	18	27	36	18
24	1,306	58	26	35	15	15	35
25	829	65	25	64	24	0	12
26	993	54	27	78	15	7	0
30	836	46	16	81	6	13	0
31	1,508	77	29	21	21	17	41
32	1,433	74	36	50	22	8	19
33	1,234	79	31	61	16	13	10
34	755	71	11	82	9	9	0
35	3,328	75	44	39	16	7	39
36	2,070	54	38	38	0	0	0
37	868	67	28	54	7	11	29
38	609	73	31	52	0	26	23
56	1,280	69	25	100	0	0	0
57	1,840	72	30	63	7	7	23
58	1,369	76	36	69	8	3	19
59	1,094	76	24	75	13	0	13
60	579	68	20	95	0	5	0
61	354	65	17	16	1	0	0
62	1,071	73	22	91	5	0	5
63	1,082	76	23	22	22	4	52
64	1,136	82	22	96	0	0	5
66	1,121	81	29	100	0	0	0
67	740	66	17	100	0	0	0
83	1,379	38	12	100	0	0	0
92	815	88	4	0	0	25	75
95	5	63	28	64	11	4	21
97	1,187	79	39	100	0	0	0
100	1,635	75	12	92	0	8	0
101	384	51	17	29	41	12	18
102	575	71	15	87	0	7	7
TOTALS	47,864		950				

TABLE 2

PROPOSED GYPSY MOTH TREATMENT UNITS, POTOMAC RD, MNF, 1993

QUAD NAME	TREAT- MENT UNIT	AREA (AC)	APPLICABLE CRITERIA NUMBER AND DISCUSSION OF EACH
Blackbird Knob	1	459	(1) High EM, (2) 1991 M-H, 1992 M-H,(3) High site oak, timber sale planned, (4) Dispersed recreation, (5) Unique paper birch stand
Hopeville	2	1057	(1) High EM, (2) 1991 M-H, 1992 L-M, (3) >80% oak, uncut timber (55AC) sale cut after May 1993
Hopeville	3	1773	(1) Mod EM, (2) 1991 L-M, 1992 N, (3) 80% oak, SI 55, TM sale with thinning and oak sprouts, fair TM Values, (4) Extremely popular hunting area
Hopeville	4	337	(1) High EM, (2) 1991 L-M, 1992 N, (3) High TM values, lower slopes oak, upper slopes spruce-mixed hardwoods
Hopeville /Upper Tract	5	641	(1) High EM, (2) 1991 L-M, 1992 N, (5) WV-AGR CSCL block to west
Hopeville /Upper Tract	6	269	(1) High EM, (2) 1991 M, 1992 M, (4) Highly sensitive recreation values, visual concerns
Petersburg West /Hopeville	7	341	(1) High EM, (2) 1991 H, 1992 L-M, (3) Highly vulnerable trees, (4) Highly sensitive recreation values along Chimney Rock Trail
Onego	8	304	(1) High EM, (2) 1991 N, 1992 N, (3) Fair TM values, (4) Highly sensitive recreation values, main view from top of Seneca Rocks
Onego	9	187	(1) High EM (Seneca Shadows C.G.), (2) 1991 N, 1992 N, (4) Highly sensitive rec values, (6) High risk of campers spreading GM beyond USDA APHIS Quarantine Area
Upper Tract	10	981	(1) High EM, (2) 1991 M, 1992 M, (3) 50% oak, remainder virginia pine and mixed hardwoods with fair TM Values
Upper Tract	11	985	(1) High EM, (2) 1991 M-H, 1992 L-M, (3) 90% oak, SI 55, fair values, (4) Popular hunting area
Hopeville	12	1363	(1) Mod EM, (2) 1991 M-H, 1992 N, (3) oak unknown, (4) Highly sensitive scenic area for tourism because viewshed is highly visible
Upper Tract	13	800	(1) High EM, (2) 1991 M-H, 1992 L-M, (3) 100% oak
Upper Tract	14	337	(1) High EM, (2) 1991 L, 1992 H, (3) oak, Virginia pine, SI 50, TM sale area,

QUAD NAME	TREAT- MENT UNIT	AREA (AC)	APPLICABLE CRITERIA NUMBER AND DISCUSSION OF EACH
Mozer/U.T.&P.W.	15	484	(1) Mod EM, (2) 1991 M-H, 1992 M-H, (3) mixed oak-pine, SI 60, now road access now
Upper Tract	16	131	(1) High EM, (2) 1991 N, 1992 N, (3) oak and mixed pine, (4) Scenic Values and Hunting Use High
Hopeville	17	307	(1) Mod-High EM, (2) 1991 N, 1992 N, (3) 100% oak, productive site
TOTAL	10,756		

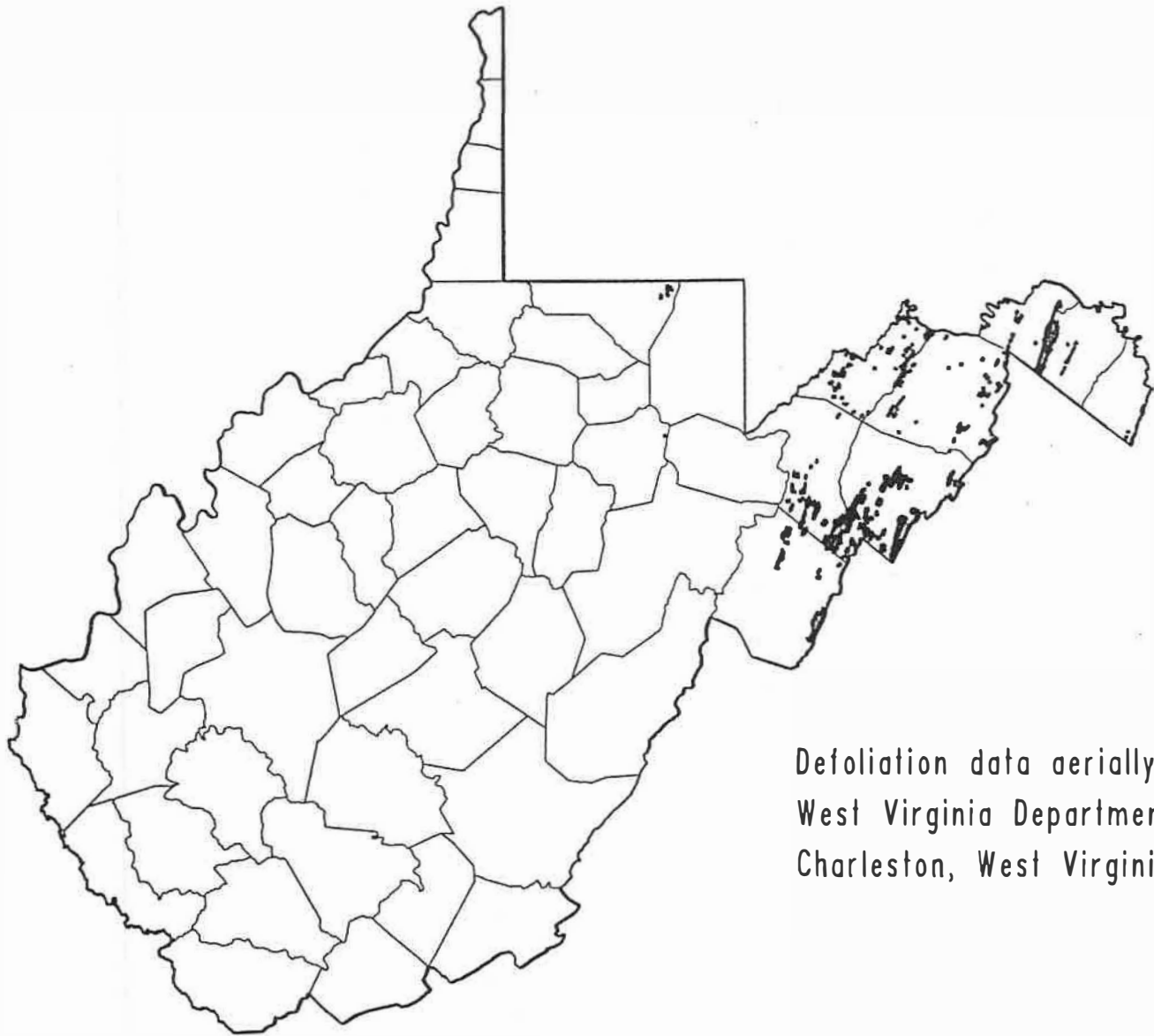
TABLE 3

MONONGAHELA NATIONAL FOREST, POTOMAC RANGER DISTRICT, WEST VIRGINIA
1993 GYPSY MOTH TREATMENT UNIT DATA

Pre-suppression Gypsy Moth Population Densities
Obtained October-November, 1992 by NA-FHP, MFO

Unit Number	WV County/USGS Quad Name	Spray Block Acres	Number of 1/40 Ac Plots	Gypsy Moth Egg Masses/Acre	
				Mean	Range
1	Grant/Blackbird Knob	459	10	1068	0 to 3960
2	Grant/Hopeville	1057	28	2184	160 to 6360
3	Grant-Pendleton/ Hopeville	1773	41	781	0 to 3360
4	Pendleton/Hopeville	337	5	1096	560 to 1520
5	Pendleton/Hopeville	641	15	1616	40 to 4320
6	Pendleton/Hopeville- Upper Tract	269	7	3057	880 to 6400
7	Grant/Hopeville Petersburg West	341	15	925	0 to 3280
8	Pendleton/Onego	304	13	763	0 to 3320
9	Pendleton/Onego	187	4	1440	760 to 2120
10	Pendleton/Upper Tract	981	24	1006	40 to 2880
11	Pendleton/Upper Tract	985	22	1653	0 to 4600
12	Grant-Pendleton/ Hopeville	1363	24	978	0 to 6360
13	Pendleton/Upper Tract	800	15	1445	0 to 4520
14	Pendleton/Upper Tract	337	11	1247	0 to 4840
15	Pendleton/Mozer, Upper Tract-Petersburg, West	484	19	958	0 to 5840
16	Pendleton/Upper Tract	131	6	986	0 to 2040
17	Pendleton/Hopeville	307	6	947	240 to 2400

1992 GYPSY MOTH DEFOLIATION IN WEST VIRGINIA



Defoliation data aerially sketchmapped by
West Virginia Department of Agriculture
Charleston, West Virginia






USDA Forest Service, Morgantown, West Virginia

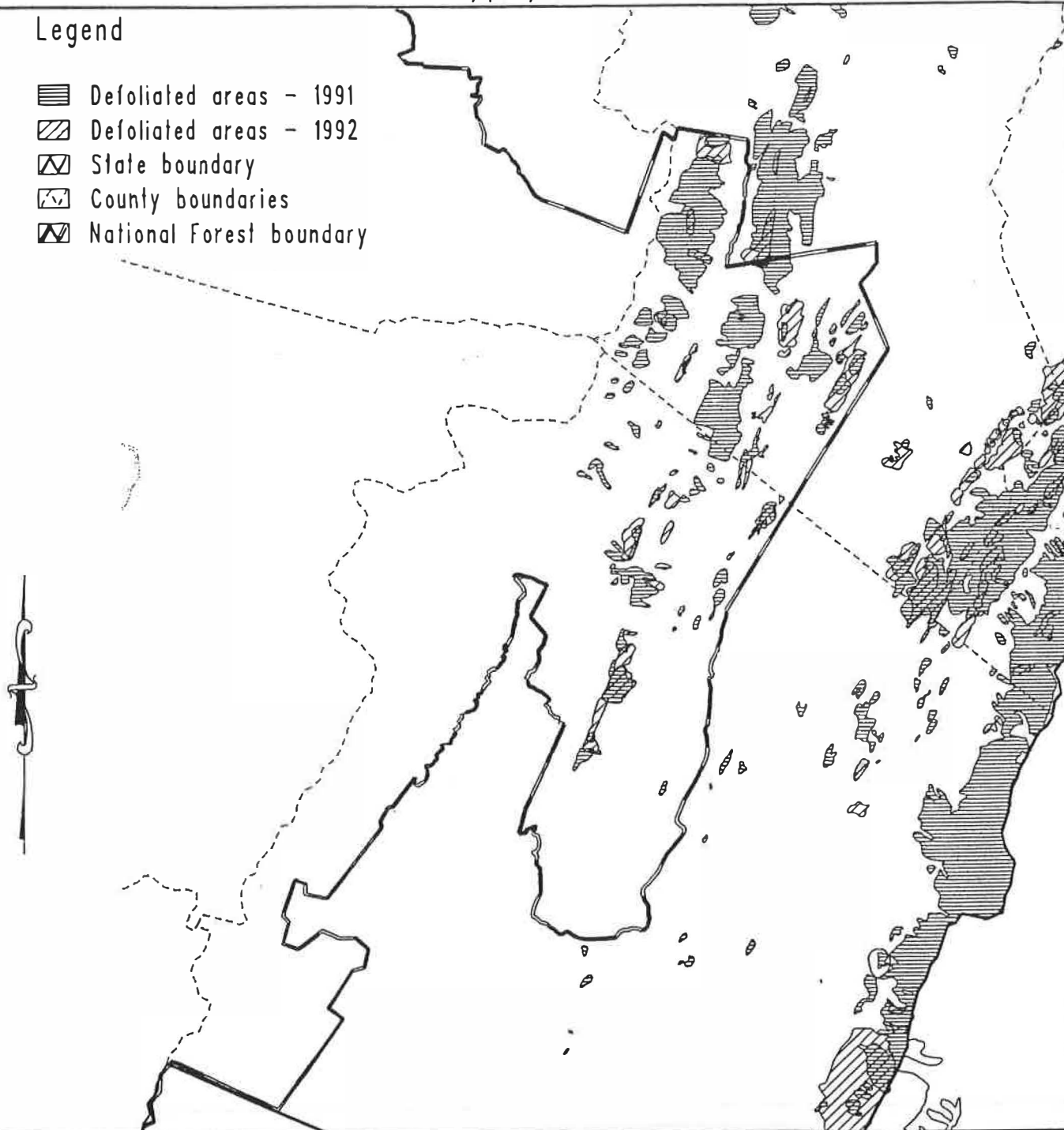
OCTOBER 1992

Monongahela National Forest - Potomac Ranger District and Vicinity

1991 and 1992 Gypsy Moth Defoliation

Legend

-  Defoliated areas - 1991
-  Defoliated areas - 1992
-  State boundary
-  County boundaries
-  National Forest boundary



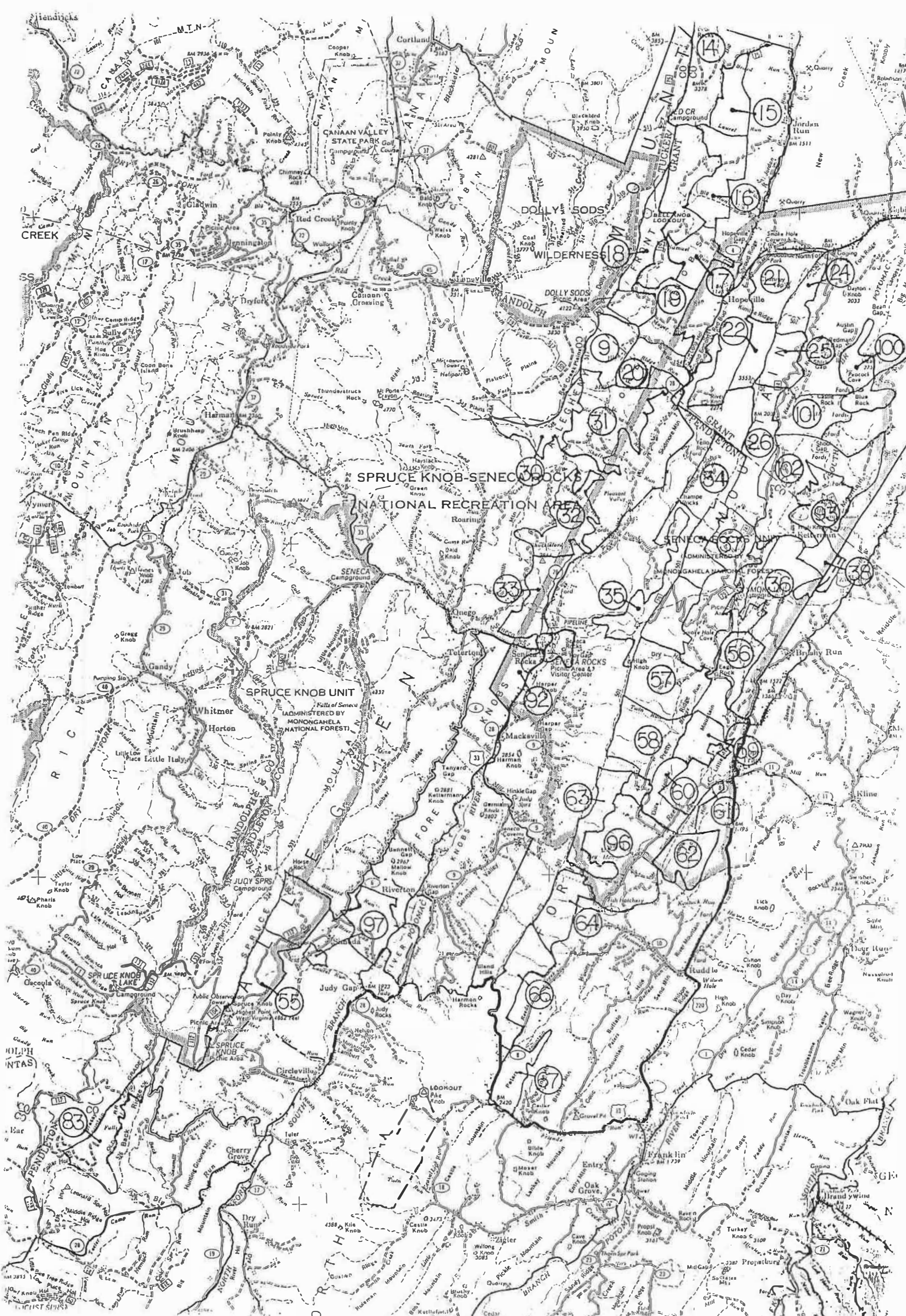
Defoliation data from aerial sketchmapping by:
West Virginia Department of Agriculture
Charleston, West Virginia and USDA Forest Service



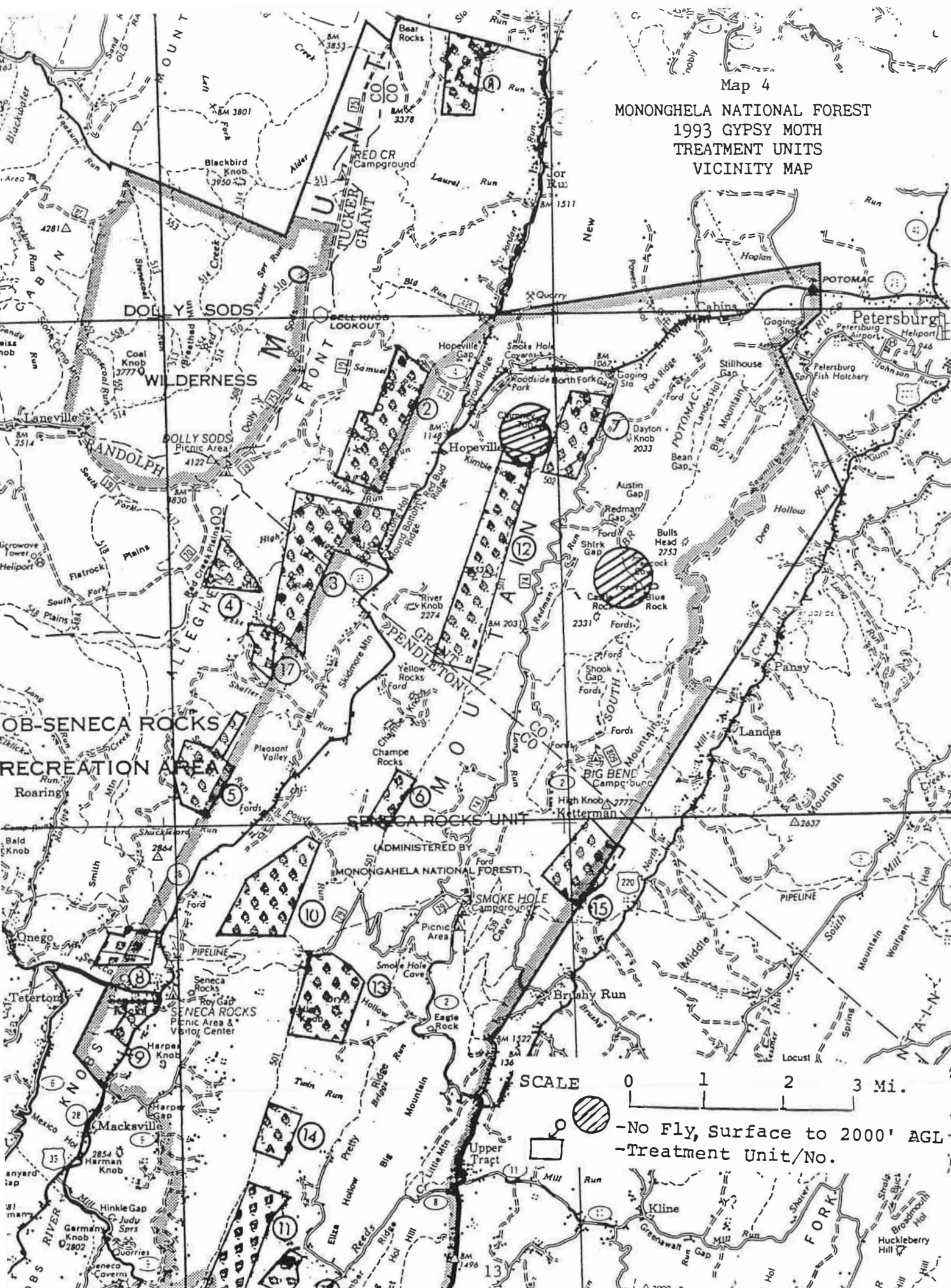
USDA Forest Service - FHP, Morgantown, West Virginia

December 1992

Map 3 - Gypsy Moth Egg Mass Surveyed Compartments,
Potomac RD., Monongahela NF, West Virginia
October - November 1992



Map 4
MONONGHELA NATIONAL FOREST
1993 GYPSY MOTH
TREATMENT UNITS
VICINITY MAP



United States
Department of
Agriculture

Forest
Service

NA

FILE

#7

Reply to: 3460

Date: February 4, 1993

Subject: Biological Evaluation of Gypsy Moth Populations

To: Forest Supervisor
Monongahela National Forest

Enclosed is the Biological Evaluation of Gypsy Moth Populations on the
Monongahela National Forest for 1992.



PETER A. RUSH
Field Representative
Forest Health Protection

Enclosure

REA/PAR/mae